Mohonk Preserve Phenology Project

Foothills & Spring Farm Phenology Trails

Volunteer Orientation Spring 2016

Saturday, March 19th, 2016

9:00 AM – 1:00 PM

Celia Cuomo, Mohonk Preserve Phenology Project Volunteer Coordinator

Christy Belardo, Citizen Science Education Coordinator

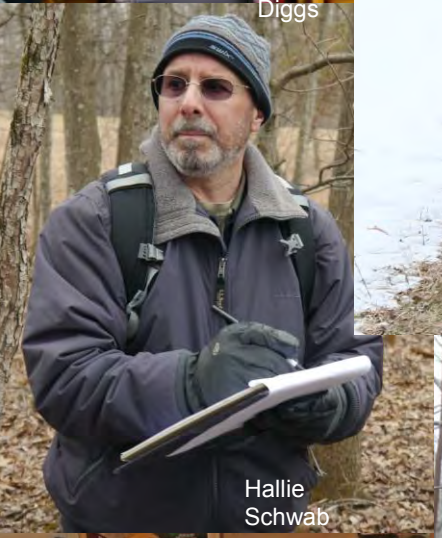
Mohonk Preserve®
saving the land for life

Photo by Hallie Schwab


Jay Diggs


Jay Diggs


Jay Diggs


Hallie Schwab


Susan Lehre


Jay Diggs


Hallie Schwab


Susan Lehre

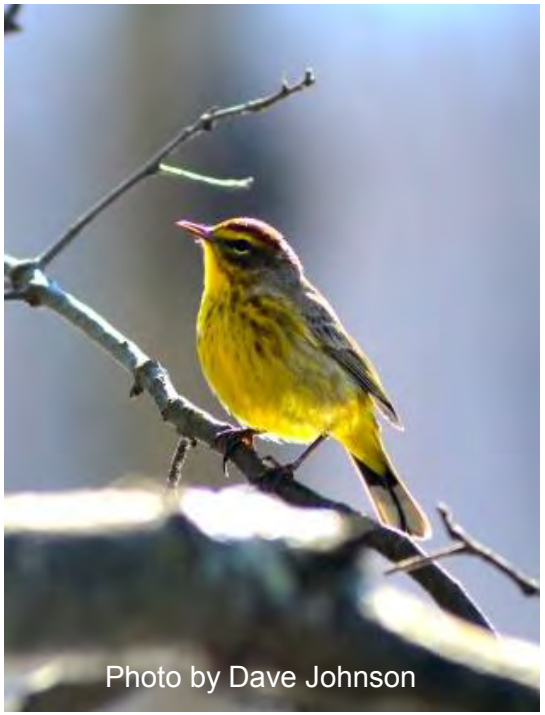
Phenology is Nature's Calendar

Branch of Science Studying:

Timing of recurring seasonal stages in plant and animal life cycles

Plant Bloom

Insect Emergence



Migration & Nest Building

Phenophase -- *observable* stage or phase in the annual life cycle of a plant or animal that can be defined by a *start and end point*

Bud

Flower

Fruit or Seed

Celia Cuomo

Trout Lily (aka Dogtooth Violet)

Egg Mass

Larvae

Adult

John Thompson

Wood Frog

What triggers the start and end of phenophases?

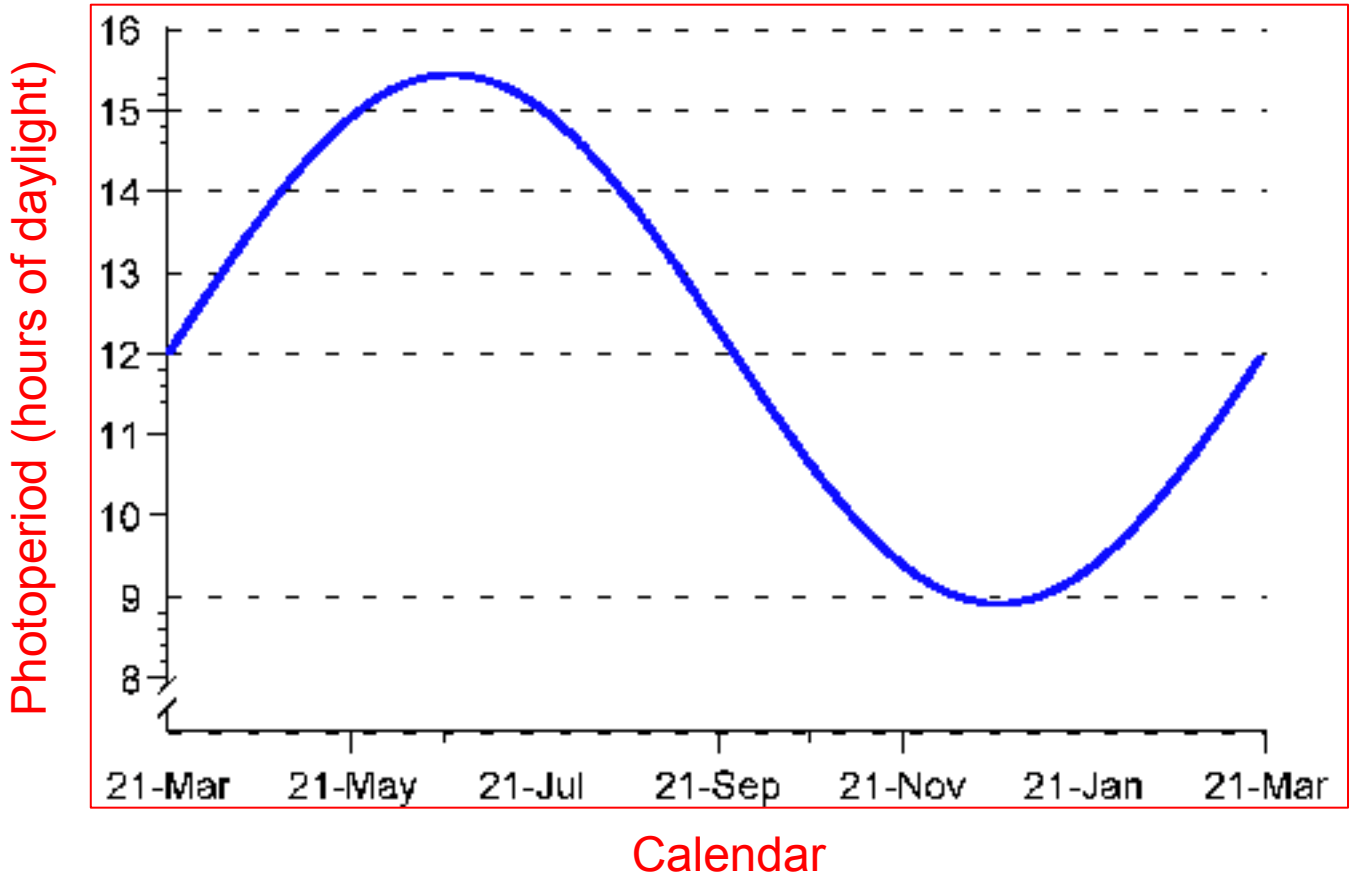
Organisms respond to environmental cues

Photoperiod (Day Length)

Weather (Temperature & Precipitation)

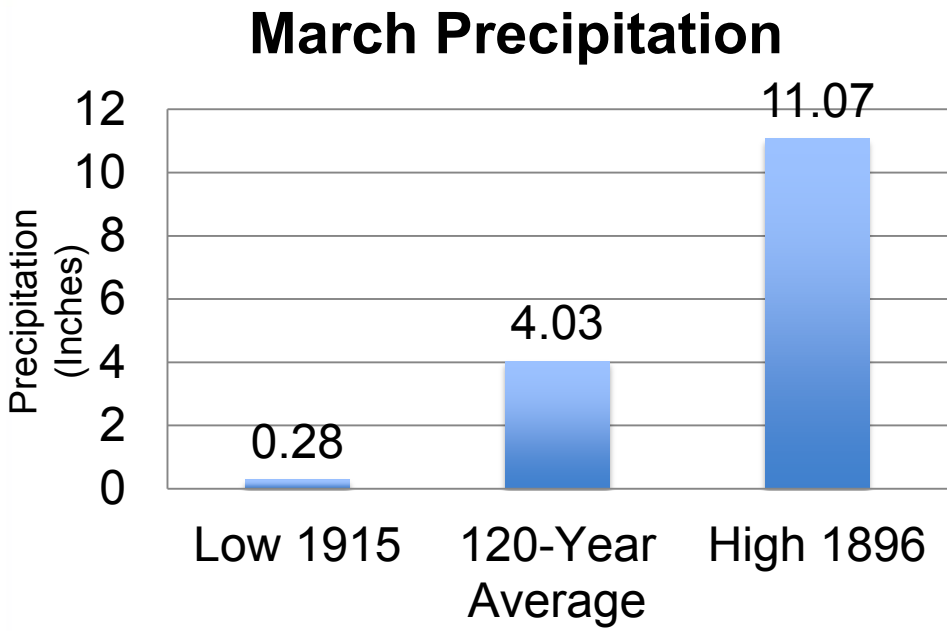
Photoperiod as a Phenophase Trigger: Same Every Year

Photoperiod vs. Calendar Date at 43.75 North Latitude



http://www.dartmouth.edu/~mpayres/teaching/hhs/PhenologyStudy.pdf

Weather as a Phenophase Trigger: Highly Variable from Year to Year

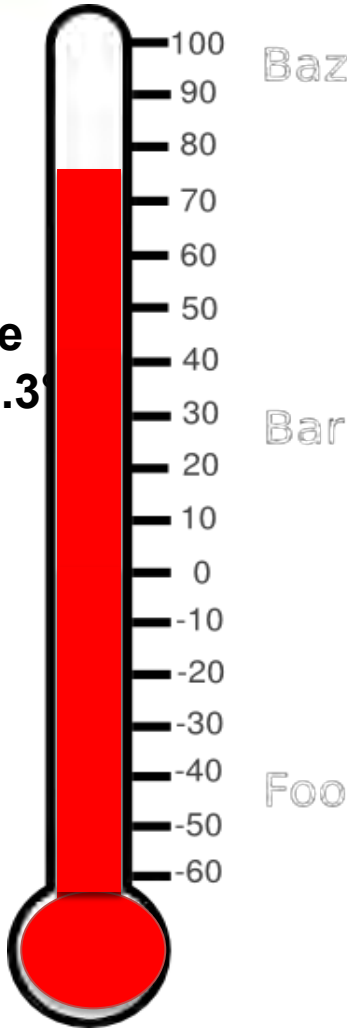


On March 28th…

High: 78°F in 1921

120-year Average Temperature: 40.3°

Low: 0°F in 1923



The Timing Has To Be Right

To Avoid Unfavorable Climatic Conditions
Plants that flower too early =>
risk frost damage

To Increase Availability of Food and Resources
Insect-eating birds tend to migrate;
while seed-eating birds may stay through the winter.

For Species Interacting
Plants and Pollinators
Predators and Prey
Hosts and Pathogens

Timing Matters: Potential for mismatch or asynchrony in species interactions

English Oak

EARLIER

Winter Moth

EARLIER

Pied Flycatcher

SAME TIME EACH YEAR

Images courtesy of the USA-NPN

Phenology and Climate Change

Research, spring timing and range A three-way mismatch

Which other species interactions might be at risk?

Both et al. 2006 Nature

Recreation/Tourism

When are the best times to see hawk migration, fall color, or peak mountain laurel bloom?

Land & Wildlife Management

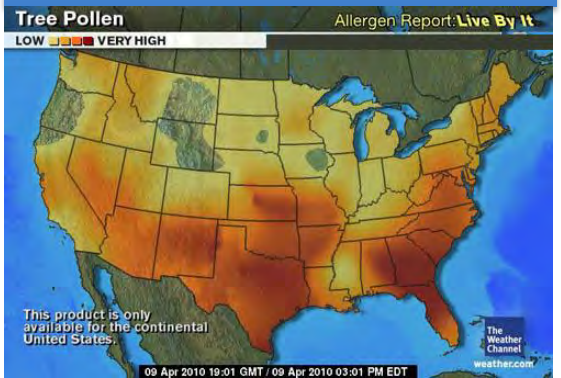
When is it advisable to use prescribed fire as a management tool?

Agriculture

When is the best time to plant seeds or harvest crops?

Public Health

Can we predict the timing of pollen release or insect emergence to alleviate allergic reactions or reduce outbreaks of disease?



Scientific Research

How is climate change affecting species interactions?

?

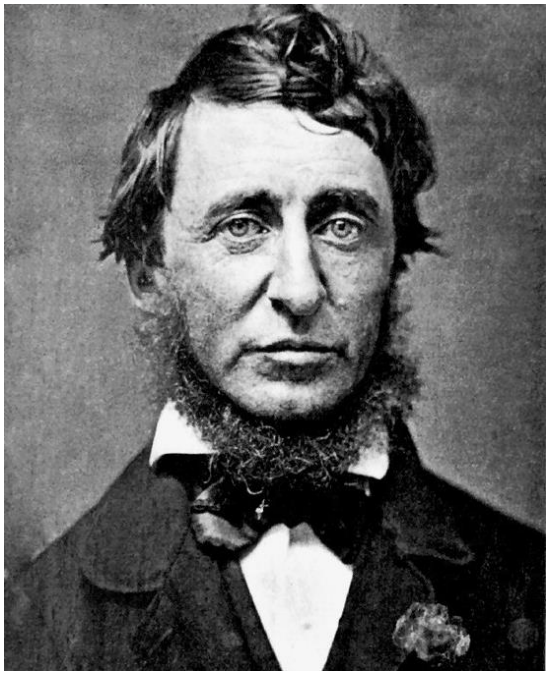
Why Study Phenology?

Phenology... is perhaps the simplest process in which to track changes in the ecology of species in response to ***climate change*****.**

--Intergovernmental Panel on Climate Change, 2007

Historic Phenology Records

Cherry Blossom - Reconstruct Spring Temperature Changes



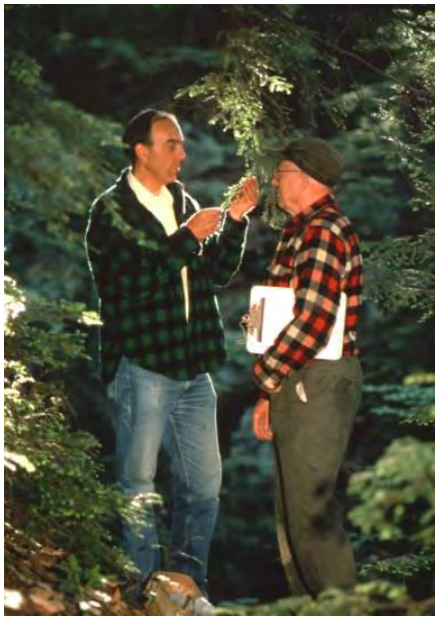
Henry David Thoreau at Walden Pond

"On average, plants in Concord appear to flower now seven days earlier than they did when Thoreau made his observations (1852–1858)."

Abe Miller-Rushing and Richard Primack, 2008

Grape Harvest - Reconstruct Spring-Summer Temperatures

Contributing to More than 120 Years of Natural History in the Shawangunks



Continuing a Long Legacy of Observational Data On the Gunks Land

Connecting Multiple Citizen Science Projects For the Bigger Picture

Climate Change Connections

Jefferson Salamander

Wood Frog

Eastern Towhee

Hermit Thrush

Black-throated Blue Warbler

Gypsy Moth Larvae

American Robin

Turkey Vulture

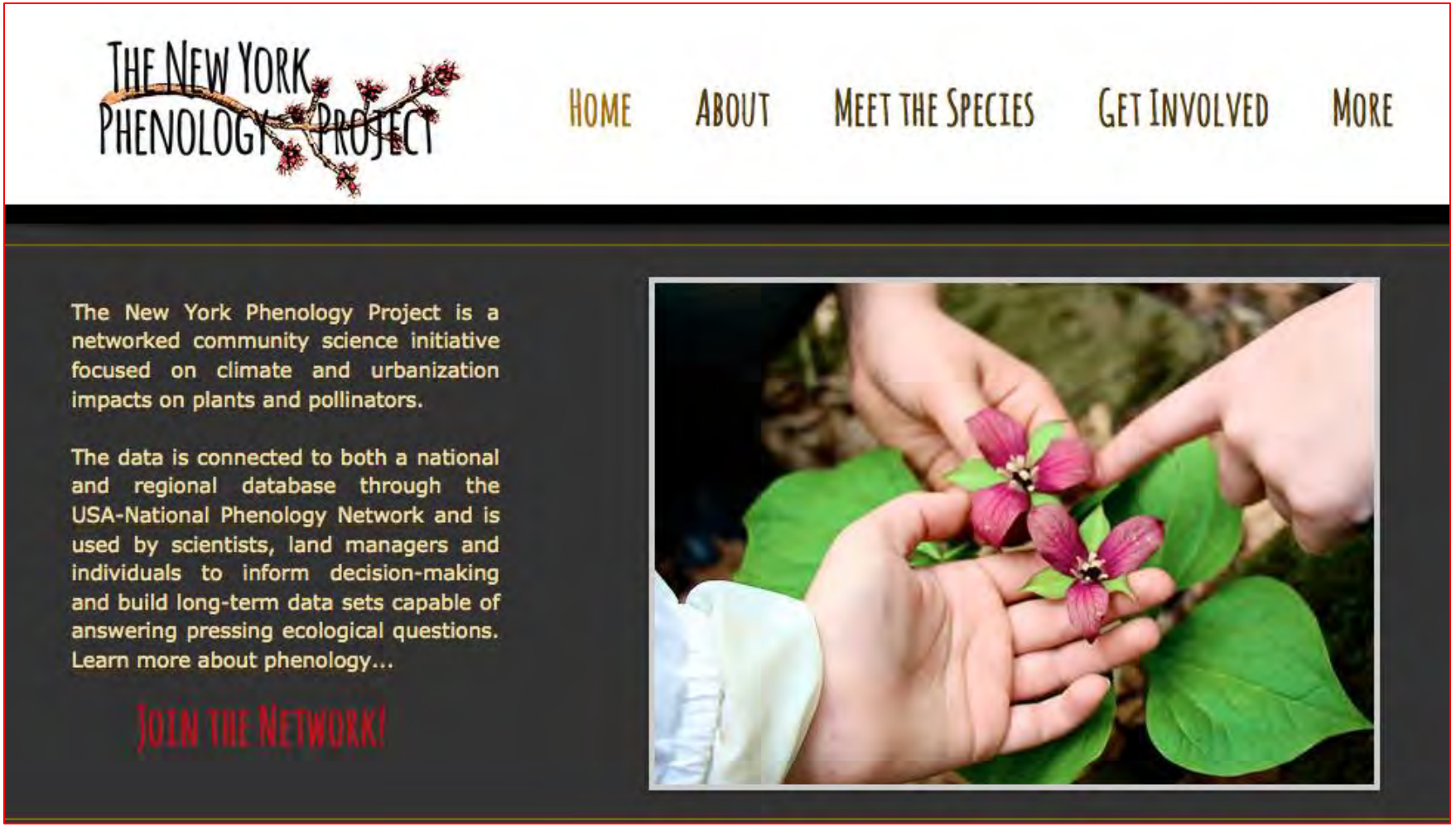
Song Sparrow

New Year-round Residents of the Shawangunks

We are part of the big picture!

Observer Groups	Observations in 2015 (not to scale)
National Phenology Network (NPN)	1,784,000 +
New York Phenology Network (NYPP)	180,000+
Phenology Observers at Mohonk Preserve	30,000+
Individuals (you!)	

New York Phenology Project



www.nyphenologyproject.org for great resources, including species profiles!

Member Organizations with Active Monitoring Sites

Central and Northern New York
Finger Lakes Land Trust, Ithaca, NY
Huyck Preserve, Rensselaerville, NY
Intervale Lowlands Preserve, Lake Placid, NY
Lime Hollow Nature Center, Cortland, NY
Parkside Drive Park, Lake Placid, NY

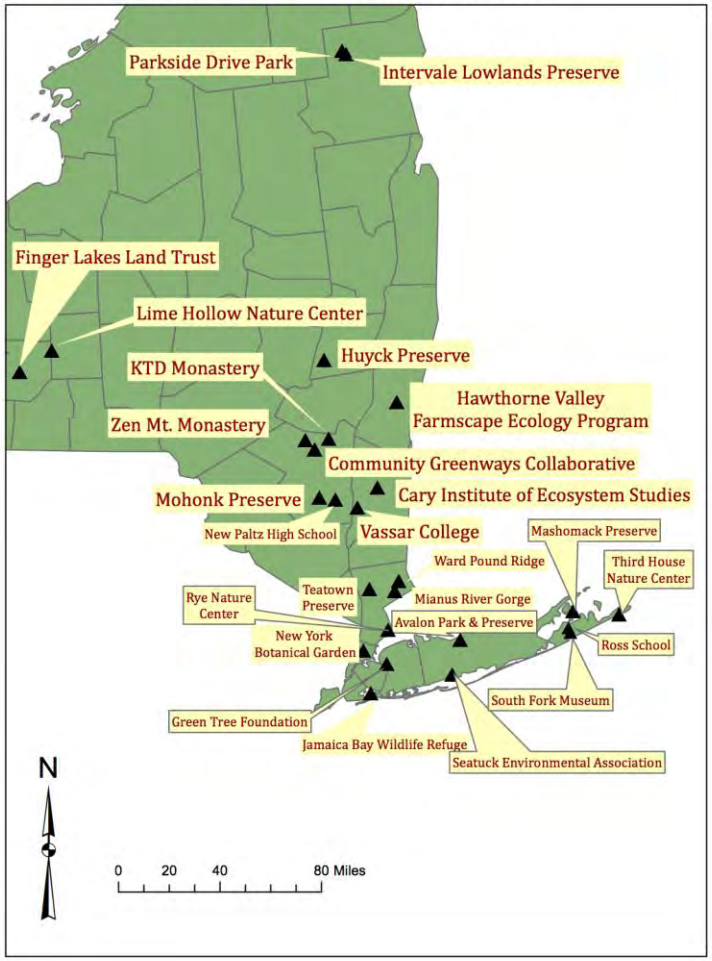
Mid and Lower Hudson Valley
Cary Institute of Ecosystem Studies, Millbrook, NY
Community Greenways Collaborative, Bearsville, NY
Mianus River Gorge, Bedford, NY
Mohonk Preserve, Gardiner, NY
New Paltz High School, New Paltz, NY
New York Botanical Garden, Bronx, NY
Rye Nature Center, Rye, NY
Teatown Lake Reservation, Ossining, NY
Vassar College, Poughkeepsie, NY
Ward Pound Ridge, Pound Ridge, NY
KTD Monastery, Woodstock, NY*
Zen Mountain Monastery, Mt. Tremper, NY*

New York City
Gateway National Recreation Area (Jamaica Bay Wildlife Refuge), Queens, NY
New York Botanical Garden, Bronx, NY

Long Island
Gateway National Recreation Area (Jamaica Bay Wildlife Refuge), Queens, NY
South Fork Natural History Museum, Bridgehampton, NY
Third House Nature Center, Montauk, NY
Avalon Park and Preserve, Stony Brook, NY*
Greentree Foundation, Manhasset, NY*
Mashomack Preserve, Shelter Island, NY*
Ross School, East Hampton, NY*
Seatuck Environmental Association, Islip, NY*

**Member Organizations with Sites Under Development*

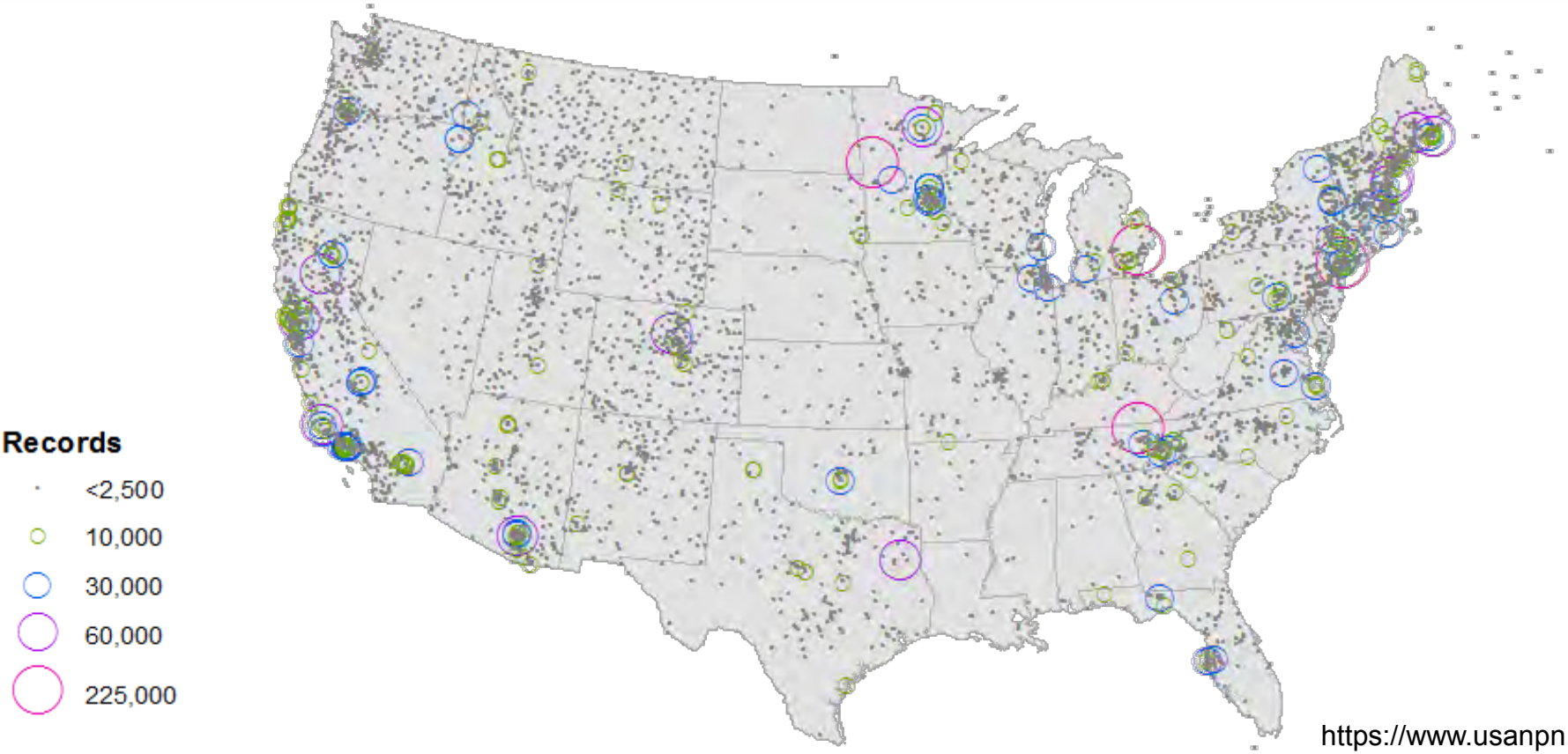
The New York Phenology Project
Partner Organizations / Monitoring Sites



USA-NPN
The National Phenology Network

nature's notebook
A project of the USA-NPN

"a national, online program where amateur and professional naturalists record observations of plants and animals to generate long-term data sets used for scientific discovery and decision-making."



https://www.usanpn.org

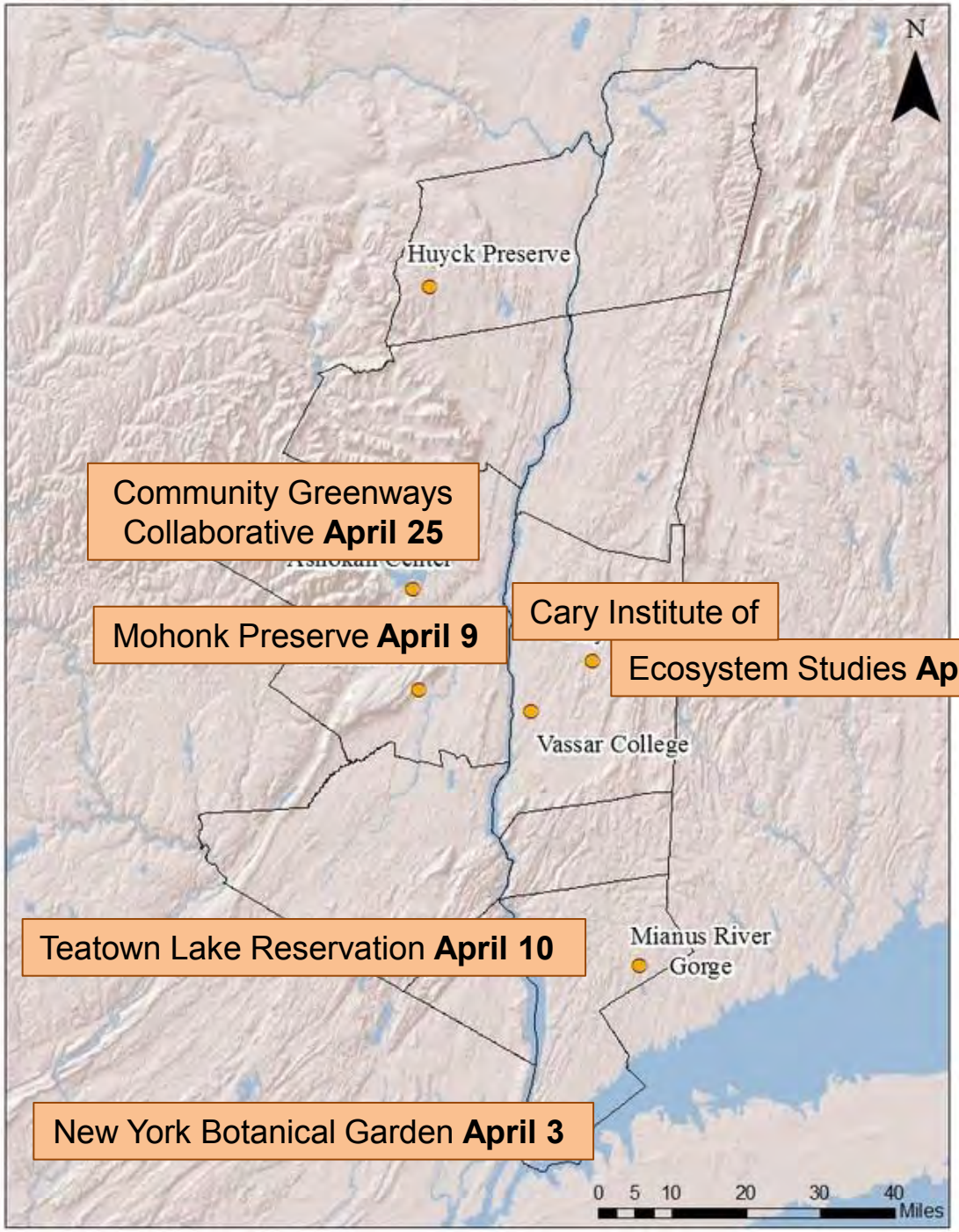
nature's notebook
A project of the USA-NPN

Register for Nature's Notebook and join a national community of observers

- Enter and Download Data
- Track your progress
- Access observation tips and resources
- Learn about how your data is used and what it's telling us

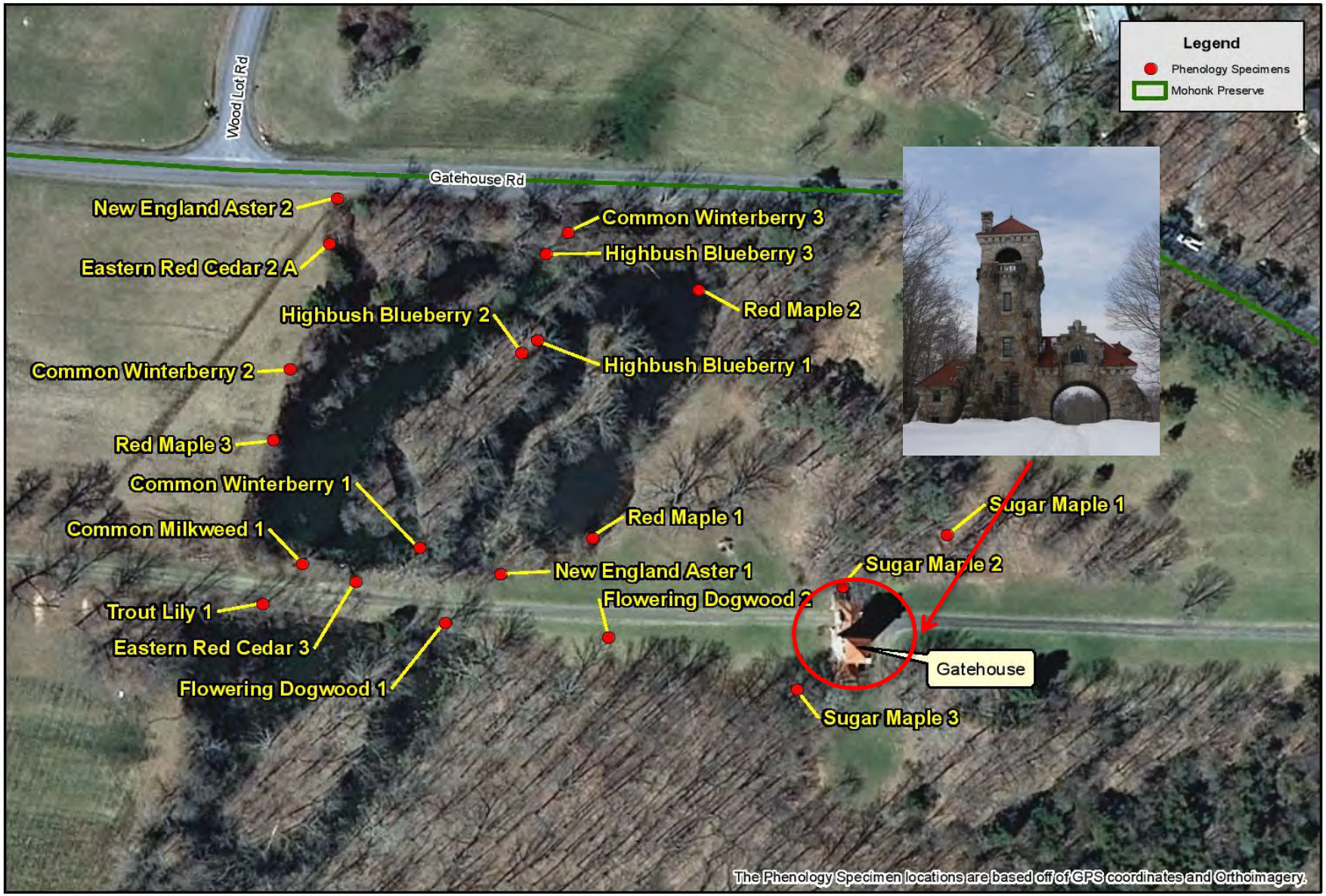
https://www.usanpn.org/natures_notebook

How did the Onset of Open Flowers in Red Maple Vary Across the Hudson Valley in 2014?



Hallie Schwab

Foothills Phenology Trail Map 2



Ed Pestone
March 8, 2016
NAD 83; UTM Zone 18N
NYS Office of Information Technology Services
(orthoimagery 2013), GIS Program Office

N

Mohonk Preserve

0 75 150 300 Feet

Spring Farm Phenology Trail Map 1

Ed Pestone
March 1, 2016
NAD 83; UTM Zone 18N
NYS Office of Information Technology Services
(orthoimagery 2013), GIS Program Office

N

Mohonk Preserve

0 100 200 400 Feet

Spring Farm Phenology Trail Map 2

Ed Pestone
March 1, 2016
NAD 83; UTM Zone 18N
NYS Office of Information Technology Services
(orthoimagery 2013), GIS Program Office

N

Mohonk Preserve

0 100 200 400 Feet

Our Continuing Species

Jack in the Pulpit fruits (ripe and unripe)

Common Milkweed *

Common Winterberry

Eastern Redcedar *

Flowering Dogwood

Highbush Blueberry

Jack in the Pulpit *

New England Aster

Red Maple

Sugar Maple *

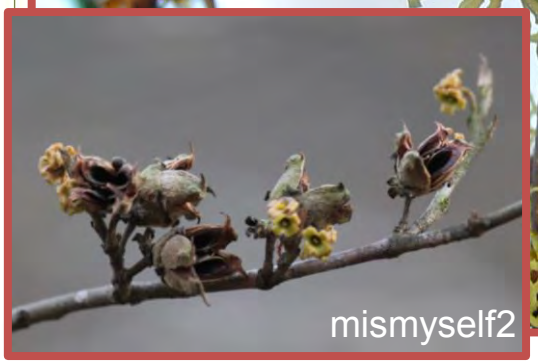
Trout Lily

Monarch Butterfly

* at both Foothills and Spring Farm

New Plant Species (at Spring Farm)

Witch Hazel



Northern Red Oak

More New Species (at Spring Farm)

Northern Spicebush

White Wood Aster

More New Species – Herps (at Foothills)

Wood Frog

David Johnson

Spring Peeper

Renee Zernitsky

David Johnson

Standardized Phenophases

ANIMAL: Monarch Butterfly

Activity

- ❑ Active individuals
- ❑ Flower Visitation
- ❑ Migrating Adults

Reproduction

- ❑ Mating

Development

- ❑ Young individuals
- ❑ Dead individuals

PLANT: Red Maple

Leaves

- ❑ Breaking Leaf Buds
- ❑ Leaves
- ❑ Colored leaves

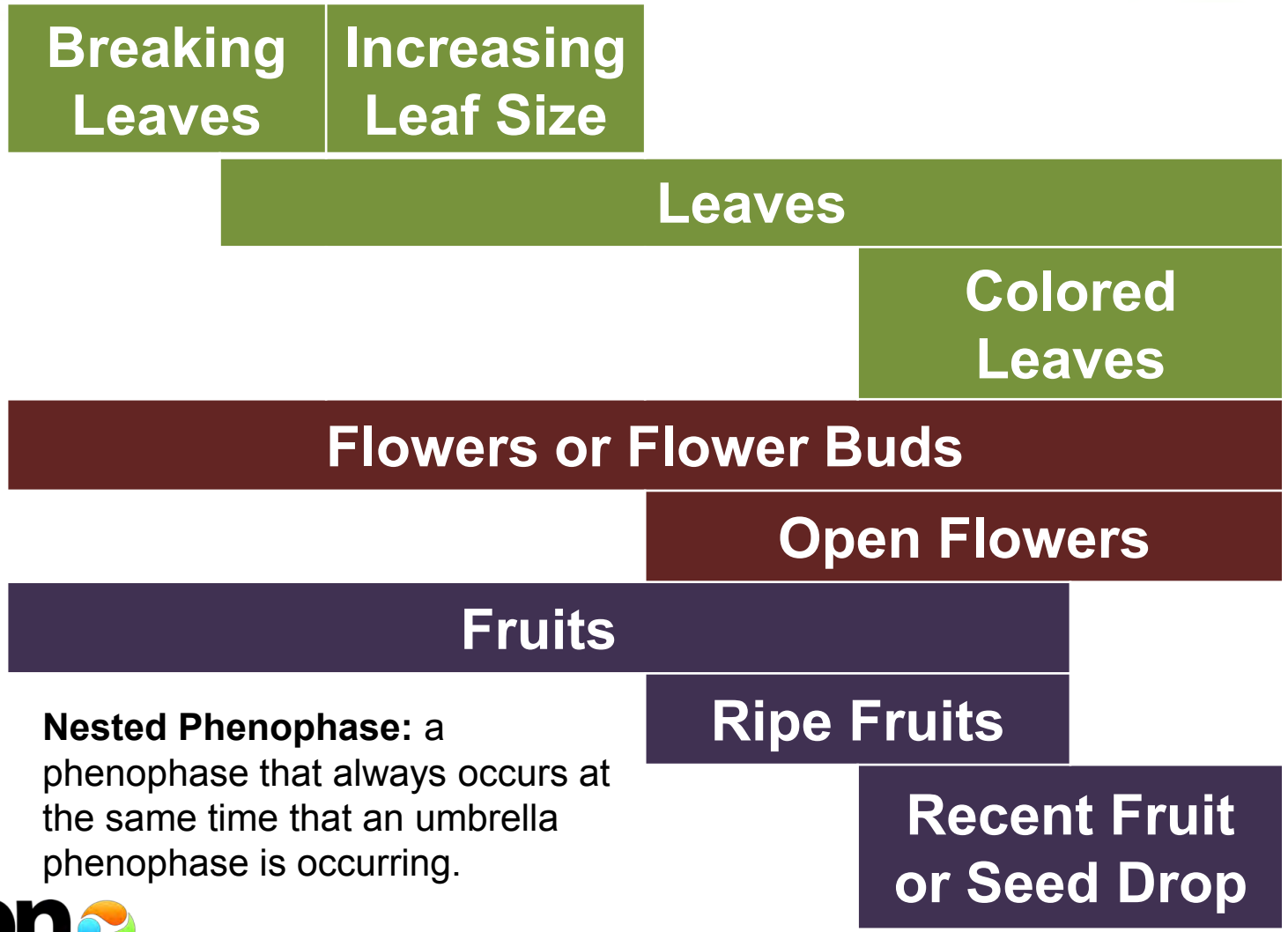
Flowers

- ❑ Flowers or flower buds
- ❑ Open flowers

Fruits

- ❑ Ripe fruits
- ❑ Recent seed or fruit drop

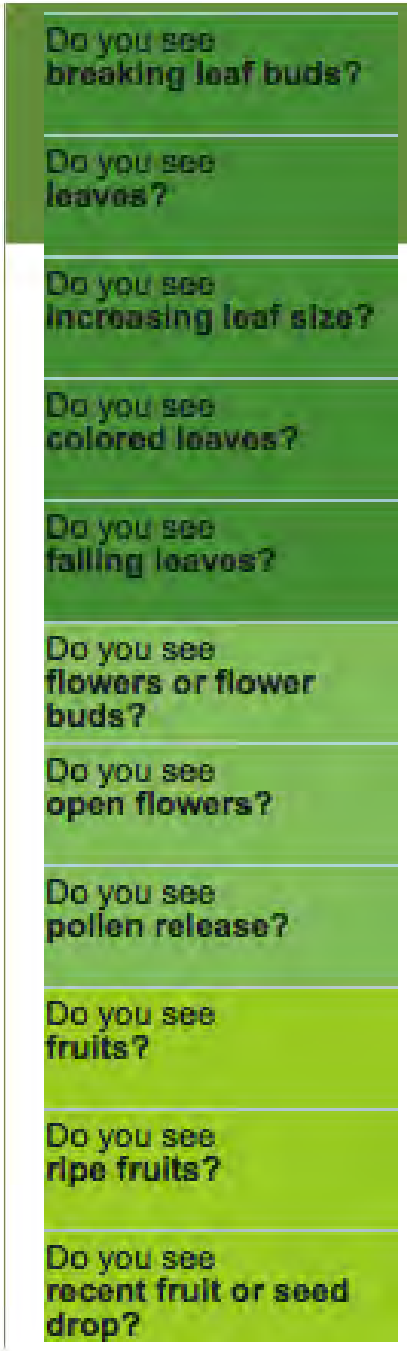
DECIDUOUS PLANT PHENOPHASES



Nested Phenophase: a phenophase that always occurs at the same time that an umbrella phenophase is occurring.

LoriAnne Barnett

Data Collection Basics



What do volunteers do?

Make and record repeated observations of plants and animal phenophases.

How Often?

As often as you'd like! Observe when you can, and don't worry when you can't—it's a group site! Once a week will allow you to see a wide range of phenophases.

What do I need?

Pencil, datasheet (or Nature's Notebook smartphone App), printed phenophase definitions. Optional: binoculars, hand-lens, clip board, camera

Look for all phenophases each time you observe

Highbush Blueberry

Hallie Schwab

Do you see
Breaking Leaf Buds?
Flower Buds?

❑ Yes

❑ No

☑?

Maurice Weitman

If you're not sure, use your **?** option, then use your resources:

- Phenology Leaders – Celia, Carol, Christy
- **Fellow Volunteers**
- Species ID Guides
- National Phenology Network Protocols
- Botany Guides and Websites

Continue to mark **Yes** for entire duration of the phenophase

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Red Maple ***Leaves***										

Keep looking even after you think the phenophase has ended.

Photos: Hallie Schwab

“Negative Data” provides supporting evidence for our observations

When are phenophases NOT occurring?

Red Maple: Open Flowers?

March 26
NO

April 2
YES

April 9
YES

(2014 dates)

Photos: Hallie Schwab

Botany Term: *Petiole*

petiole = stalk that attaches leaf to stem or branch

In our protocols, a *breaking leaf bud* becomes a *leaf* only once the petiole is visible

Breaking Leaf Buds or Leaves?

Breaking leaf buds	y n ? _____
Leaves	y n ? _____
Increasing leaf size	y n ? _____
Colored leaves	y n ? _____
Falling leaves	y n ? _____

Closed Leaf Bud

E.G. Denny

- Breaking Leaf Buds

E.G. Denny

Leaves
Petiole (stem) visible

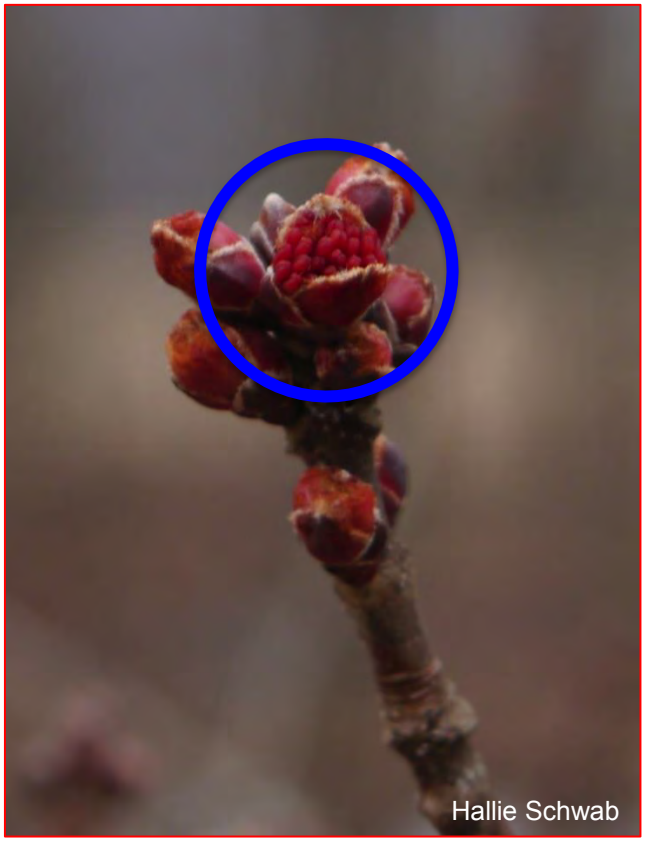
Photos: Hallie Schwab except where indicated

Red Maple

Flowers or flower buds	y n ? _____
Open flowers	y n ? _____
Pollen release	y n ? _____

Flower Buds

One Open Flower & Flower Buds



Open Flowers?

Flowers or flower buds	y n ? _____
Open flowers	y n ? _____
Pollen release	y n ? _____

Red Maple, Hallie Schwab

Sugar Maple
Joseph Berger, Bugwood.org

Flower Buds or Open Flowers?
Trout Lily

Flower Buds

Open Flowers

Celia Cuomo

*Must See Reproductive Parts to be Open Flower

Pop Quiz
What phenophases do you see?

E.G. Denny

Leaves

Hallie Schwab

Flowers or Flower Buds

Open Flowers

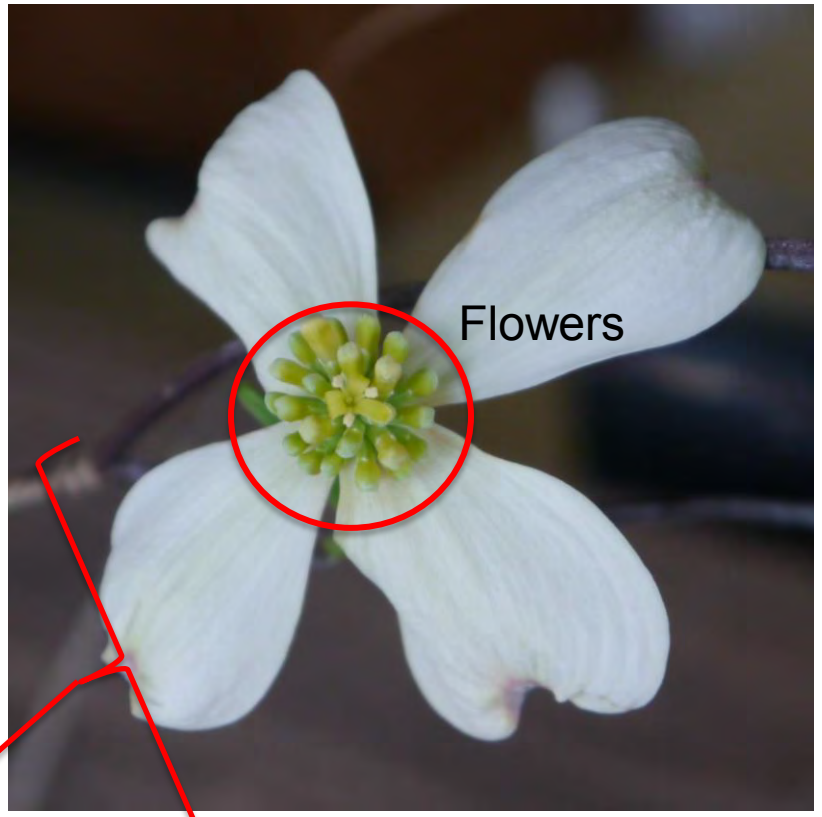
Leaves

Botany Term: *Bract*

bract = a modified leaf, often beneath or surrounding the flower (sometimes confused with petals)

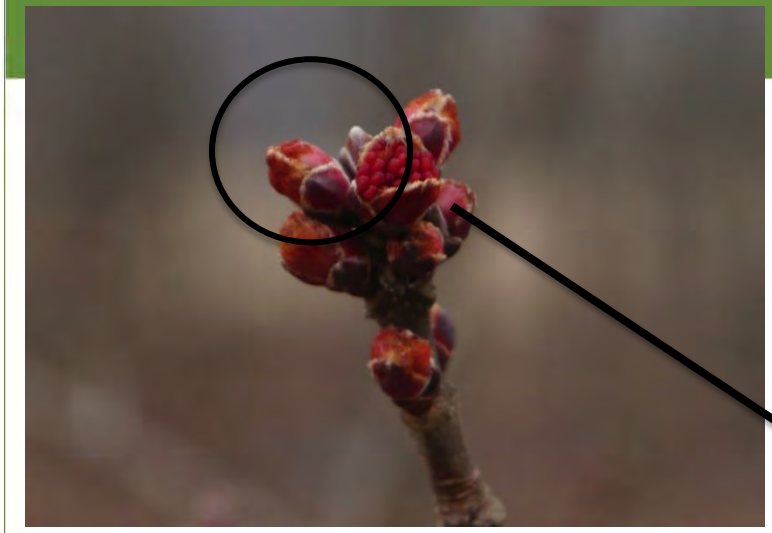
Scott Bauer, USDA

Flowering Dogwood



Hallie Schwab

Leaf Buds or Flower Buds?

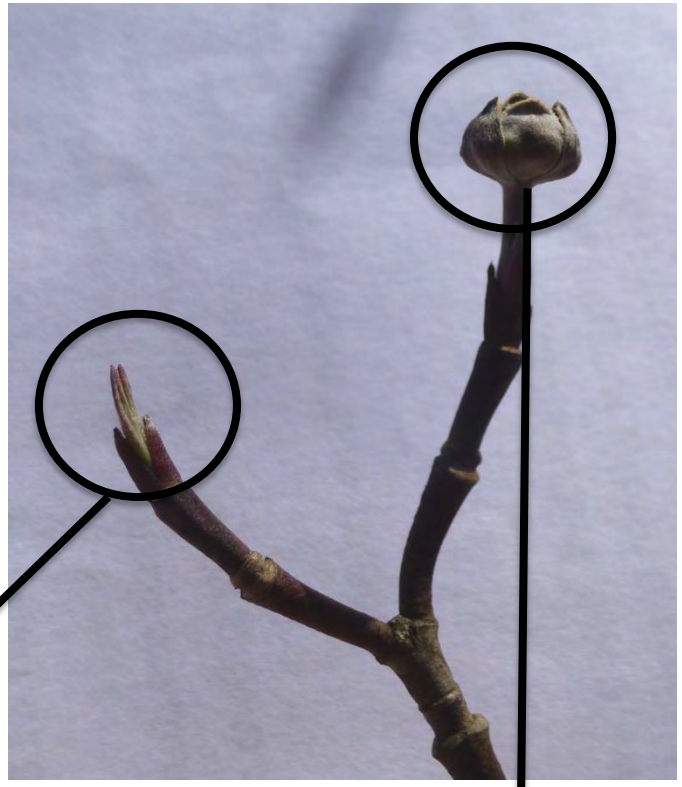


Red Maple
Hallie Schwab

Highbush Blueberry
Hallie Schwab

Flower Buds

Leaf Buds



Flowering Dogwood
Maurice Weitman

Immature Bracts

The Special Case of the Flowering Dogwoods: Flowers

- Bracts (open)
- Flower Buds, closed (inside bracts)

Celia Cuomo

- Bracts (open)
- Open Flowers & Buds

Celia Cuomo

The Special Case of a Conifer: Eastern Redcedar

Male Cones

Celia Cuomo

Female Cones

Hallie Schwab

Pop Quiz
What phenophases do you see?

Red Maple

Flowers or Flower Buds

Open Flowers

Breaking Leaf Bud

Highbush Blueberry

Hallie Schwab

Flowers or Flower Buds

Open Flowers

Leaves

Monarch Butterfly Phenophases

	Date:
Do you see/hear...	Time:
Active adults	y n ? _____
Flower visitation	y n ? _____
Migrating adults	y n ? _____
Mating	y n ? _____
Active caterpillars	y n ? _____
Caterpillars feeding	y n ? _____
Dead adults	y n ? _____
Dead caterpillars	y n ? _____
Individuals at a feeding station	y n ? _____
Individuals in a net	y n ? _____
Check when data entered online:	☐
Comments:	

Hallie Schwab

How can you make your data more accurate?

□YES □ NO

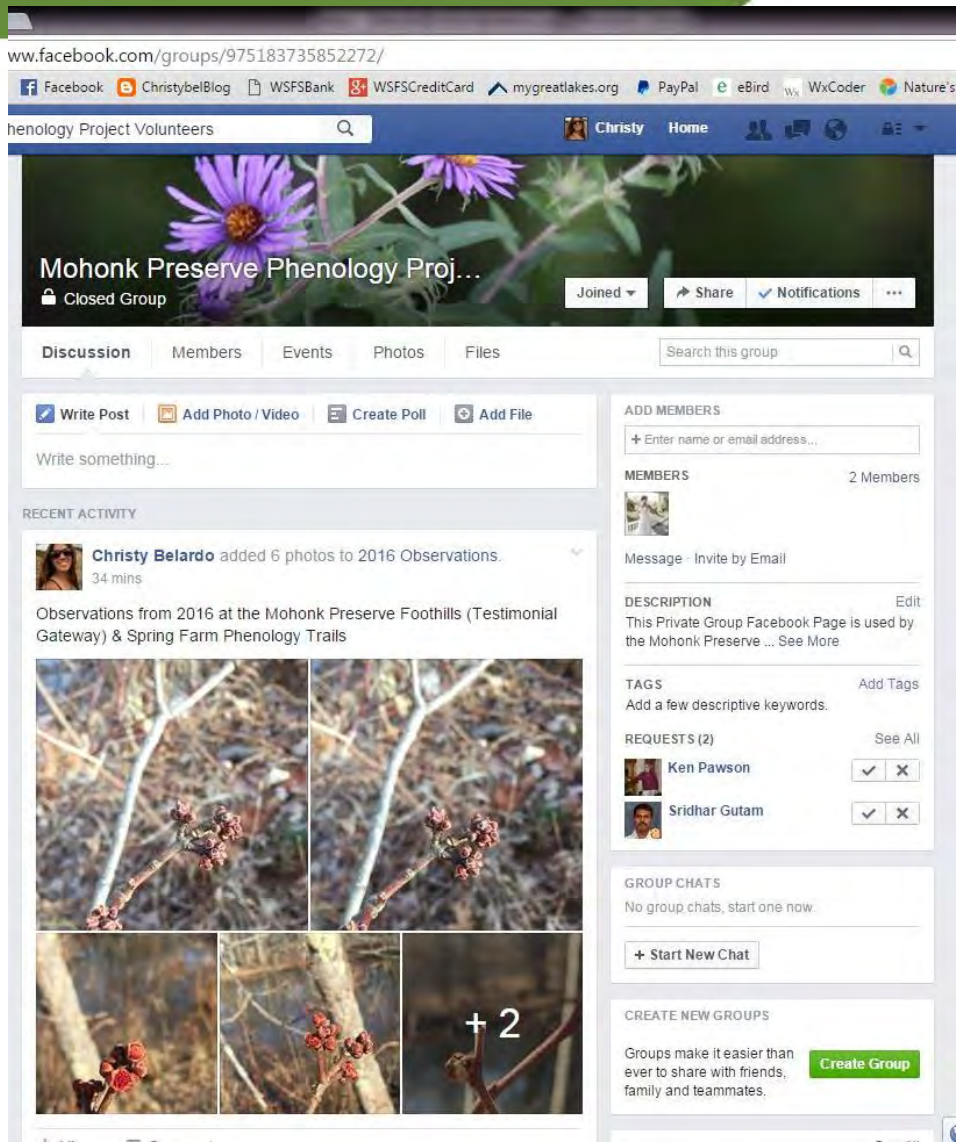
□?

Don’t guess!

Use “?” when in doubt (you can change it later)

Where to Get Help & Learn More

- Informal field sessions & workshops
  - Collaboration
  - Group Effort & Discussion
- Phenophase Definitions
  - (National Phenology Network)
- Species ID Guides
  - (New York Phenology Project)
- Phone a Friend
- Ask staff & other volunteers
  - Photos are helpful when e-mailing questions
- Facebook Group – Private Forum
  - “Mohonk Preserve Phenology Project Volunteers”



Our Phenology Community

Make friends . Exchange Contact Info

Welcome New Volunteers . Have fun!

Upcoming Pheno Dates

- Tuesday, March 29 – 9:30am – 11:30am
  - Informal Field Session at Foothills
- Tuesday, April 19 – 7:00pm – 9:00pm
  - Tricky Phenophase Workshop at VC Conference Room
- Friday, May 13 – 9:30am – 11:30am
  - Informal Field Session at Spring Farm
- Tuesday, June 21 – 5:30pm – 7:30pm
  - Phenology Volunteer Picnic at Slingerland Pavillion

Contact

Christy Belardo

Citizen Science Education Coordinator

cbelardo@mohonkpreserve.org

845.255.0919 ext. 1235 (Visitor Center)

Ext. 1271 (Daniel Smiley Research Center)

845.419.1595 (Cell Phone)

Michael Neill O'Donnell

Thank You

Mohonk Preserve Phenology Project Volunteer Observers, Mohonk Preserve Staff, Daniel Smiley Research Center, the Mohonk Preserve Volunteer Photographers, Celia Cuomo National Phenology Network, New York Phenology Project